

Scientific report on the School „Patterns of Symmetry Breaking”

The School was held in Marian Smoluchowski Institute of Physics of Jagiellonian University (street Reymonta 4, 30-059 Cracow). Large “Henryk Niewodniczański” lecture hall with its equipment (a beamer, video player, etc.), computer rooms and the library were available to the participants. The arrival and departure days were Sunday, September 15, and Sunday, September 29, respectively. September 22 (also Sunday) was a free day. Lecturers were lodged in hotel “Cracovia”, students in hotel “Alfa”. Meals were served in student canteen “Żaczek”. The hotels and the canteen lie within short walking distance (~5 minutes) from the Institute.

The School was opened with a lecture by Tom Kibble on Monday, Sept. 16, morning. Here is the complete list of lectures in the chronological order of their presentation.

1. T. W. B. Kibble “Symmetry breaking and defects” (3 lectures)
2. P. McClintock “Superfluids: Helium-4” (3)
3. J. Sznajd “Introduction to the modern theory of critical phenomena” (2)
4. M. Sakellariadou “The role of topological defects in cosmology” (2)
5. M. Krusius “Defects in rotating Helium-3” (3)
6. W. Żurek “Predictions of defect densities” (3)
7. H. Kleinert “Vortex lines and superconducting phase transition” (1)
8. A. C. Davis “Particle cosmology” (2)
9. H. Arodź “Evolution of vortices and interfaces” (2)
10. R. Monaco “Defects in Josephson tunnel junctions” (1)
11. G. Pickett “Superfluids: Helium-3” (3)
12. A. Achúcarro “Vortices and flat directions” (1)
13. T. Vachaspati “Domain walls” (2)
14. J. Dziarmaga “Nonequilibrium Mott transition” (1)
15. O. Lavrentovich “Defects in liquid crystals” (3)
16. M. Nowak “Phase transitions in QCD” (2)
17. W.G. Unruh “Dumb holes – experimental black holes?” (3)
18. J. R. Anglin “Bose-Einstein condensates” (2)
19. G. Volovik “Condensed matter /cosmology dictionary” (3)

The lectures were supplemented by four “Question & answer” sessions. Students (as well as colleagues lecturers) asked many questions, and discussions were lively. I was told that already one of them resulted in writing a paper.

There also were short talks (20 minutes each):

1. U. Ibadova “Spontaneous breaking of symmetry and fundamental mass”
2. J. Striet “On the core instability of ‘t Hooft-Polyakov monopoles”
3. Y. Lemperiere “New results on superconducting cosmic strings”
4. R. Mańka and I. Więcek “ Gravitational waves generation during the phase transition in the compact neutron star”
5. T. Girard “Detecting explosive nucleation in type-I superconductors”
6. J. Paramos “Topological defect densities in type-I superconductors”
7. Y.V. Dumin “Anomalous flux generation in the multi-Josephson junction loops: recent laboratory results and their cosmological implications”

8. A. Finne “Non-linear vortex-line formation in rotating superfluid He-3-B”
9. R. Hänninen “Vortices at the A-B phase boundary in superfluid He-3”
10. E. Moulin “New generation detector for supersymmetric particles search: MACHe 3”
11. E. Maslov “Point-to-point description of the bubble wall dynamics”
12. L. Bettencourt “ A step beyond the bounce: quantum real time evolution of nucleating bubbles”
13. F. Bruckmann “Monopoles inside multi-calorons”
14. M. Sadzikowski “Andreev reflection in superconducting QCD”
15. Y. Gül “Hamilton-Jacobi treatment of supersymmetric quantum mechanics”
16. L. Hadasz “Non-commutative solitons”
17. E. Prodan “Continuous symmetry breaking for Kohn-Sham equations”

Two “round table” discussions were held on the first and the last days of the School. Especially interesting was the second one - after two weeks of intensive studies the participants were able to make interesting comments, express reasonable hopes, and see the “Coslab” Programme in its full potential.

My personal feeling is that the School was a good one. In particular, I was deeply impressed by the very high quality of almost all lectures. They were comprehensive, and at the same time very lucid. Many of them attracted attention of the local physics community in Cracow. The School consolidated the “Coslab” community, and acquainted with the Programme young and older reserchers from outside.

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